

**10.0 CONSTRUCTION MONITORING**

- 10.1 It is recommended that Twining be retained to observe the excavation, earthwork, and foundation phases of work to determine that the subsurface conditions are compatible with those used in the analysis and design.
- 10.2 Twining can provide observation and field testing to determine if the recommendations of the project geotechnical report are achieved. Upon completion of the work, we will provide a written summary of our observations, field testing and conclusions regarding the conformance of the completed work to the intent of the project geotechnical report. This service is not, however, part of this current contractual agreement.
- 10.3 Compaction tests should be conducted at a frequency of at least:

Area	Minimum Test Frequency
Mass Fills or Subgrade	1 test per 2,000 square feet per compacted 6-inch lift
Pavement Subgrade	1 test per 5,000 square feet per compacted 6-inch lift
Utility Lines	1 test per 150 feet per 6-inch lift

The above testing frequencies are suggested rates for tests. Testing frequency should be adjusted by the field technician and the engineer as needed based on continuous earthwork observation considering the methods used for compaction and the soil conditions.

- 10.4 In the event that the earthwork operations for this project are conducted such that the construction sequence is not continuous, (or if construction operations disturb the surface soils) we recommend that the exposed subgrade to receive floor slabs be tested to verify adequate compaction and/or moisture conditioning. If adequate compaction or moisture contents are not verified, the fill soils should be over-excavated, scarified, moisture conditioned and compacted are recommended in the Recommendations section of this report.
- 10.5 The construction monitoring is an integral part of this investigation. This phase of the work provides Twining the opportunity to verify the subsurface conditions interpolated from the soil borings and make alternative recommendations if the conditions differ from those anticipated.

10.6 If Twining is not afforded the opportunity to provide engineering observation and field-testing services during construction activities related to earthwork, foundations, pavements and trenches; then, Twining will not be responsible for compliance of any aspect of the construction with our recommendations or performance of the structures or improvements if the recommendations of this report are not followed. We recommend that if a firm other than Twining is selected to conduct these services that they provide evidence of professional liability insurance of at least \$3,000,000 and review this report. After their review, the firm should, in writing, state that they understand and agree with the conclusions and recommendations of this report and agree to conduct sufficient observations and testing to ensure the construction complies with this report's recommendations. Twining should be notified, in writing, if another firm is selected to conduct observations and field-testing services prior to construction.

10.7 Upon the completion of work, a final report should be prepared by Twining per the requirements of the California Building Code, Chapter 33A, "Excavation and Grading," Section 3318.1, "Final Reports." This report is essential to ensure that the recommendations presented are incorporated into the project construction, and to note any deviations from the project plans and specifications. The client should notify Twining upon the completion of work to provide this report. This service is not, however, part of this current contractual agreement.

## **11.0 NOTIFICATION AND LIMITATIONS**

11.1 The conclusions and recommendations presented in this report are based on the information provided regarding the proposed construction, and the results of the field and laboratory investigation, combined with interpolation of the subsurface conditions between boring locations.

11.2 The nature and extent of subsurface variations between borings may not become evident until construction.

11.3 If variations or undesirable conditions are encountered during construction, Twining should be notified promptly so that these conditions can be reviewed and our recommendations reconsidered where necessary. It should be noted that unexpected conditions frequently require additional expenditures for proper construction of the project.

11.4 If the proposed construction is relocated or redesigned, or if there is a substantial lapse of time between the submission of our report and the start of work (over 12 months) at the site, or if conditions have changed due to natural cause or construction operations at or adjacent to the site, the conclusions and recommendations contained in this report should be considered invalid unless the changes are reviewed and our conclusions and recommendations modified or approved in writing.

- 11.5 Changed site conditions, or relocation of proposed structures, may require additional field and laboratory investigations to determine if our conclusions and recommendations are applicable considering the changed conditions or time lapse.
- 11.6 The conclusions and recommendations contained in this report are valid only for the project discussed in the Anticipated Construction section of this report. The use of the information and recommendations contained in this report for structures on this site not discussed herein or for structures on other sites not discussed in the Site Description section of this report, is not recommended. The entity or entities that use or cause to use this report or any portion thereof for another structure or site not covered by this report shall hold Twining, its officers and employees harmless from any and all claims and provide Twining's defense in the event of a claim.
- 11.7 This report is issued with the understanding that it is the responsibility of the client to transmit the information and recommendations of this report to developers, owners, buyers, architects, engineers, designers, contractors, subcontractors, and other parties having interest in the project so that the steps necessary to carry out these recommendations in the design, construction and maintenance of the project are taken by the appropriate party.
- 11.8 This report presents the results of our preliminary geotechnical engineering investigation report only and should not be construed as an environmental audit or study.
- 11.9 Our professional services were performed, our findings obtained, and our recommendations prepared in accordance with generally-accepted engineering principles and practices in the City of Morgan Hill as of the date of this report. This warranty is in lieu of all other warranties either expressed or implied.
- 11.10 This investigation report should not be used in the preparation of a Storm Water Pollution Prevention Plan (SWPPP). Use of this report or any data included in the report in preparation of a SWPPP would be at the owner's sole risk.
- 11.11 Reliance on this report by a third party (i.e., that is not a party to our written agreement) is at the party's sole risk. If the project and/or site are purchased by another party, the purchaser must obtain written authorization and sign an agreement with Twining in order to rely upon the information provided in this report for design or construction of the project.

***Browman Development Company, Inc.***  
***November 1, 2004***

***A07261.03-01***  
***Page No. 45***

We appreciate the opportunity to be of service to Browman Development Company, Inc. If you have any questions regarding this report, or if we can be of further assistance, please contact us at your convenience.

Sincerely,  
**THE TWINING LABORATORIES, INC.**

**DRAFT**

Harry C. Wise  
Monterey Area Engineering Manager  
Geotechnical Engineering Division

**DRAFT**

Read L. Andersen, RCE  
Division Manager  
Geotechnical Engineering Division

HCW/RLA/ah/amh

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**APPENDIX A**

**DRAWINGS**

Drawing No. 1 - Site Location Map

Drawing No. 2 - Test Boring and R-Value Location Map



SOURCE: U.S.G.S. TOPOGRAPHIC MAP, 7 1/2 MINUTE SERIES  
MORGAN HILL, CALIFORNIA QUADRANGLE, PHOTOREVISED 1980

0 2000  
APPROXIMATE SCALE  
IN FEET

SITE LOCATION MAP  
BROWMAN DEVELOPMENT  
MORGAN HILL SHOPPING CENTER  
MORGAN HILL, CALIFORNIA

FILE NO.:  
07261-01-01

DATE:  
06/10/04

DRAWN BY:  
WME

APPROVED BY:

PROJECT NO.  
A07261.03

DRAWING NO.  
1



THE  
**TWINING**  
LABORATORIES, INC.  
FRESNO/MODESTO/VISALIA/BAKERSFIELD/MONTEREY

NEW ROAD

COCHRANE ROAD

HIGHWAY 101

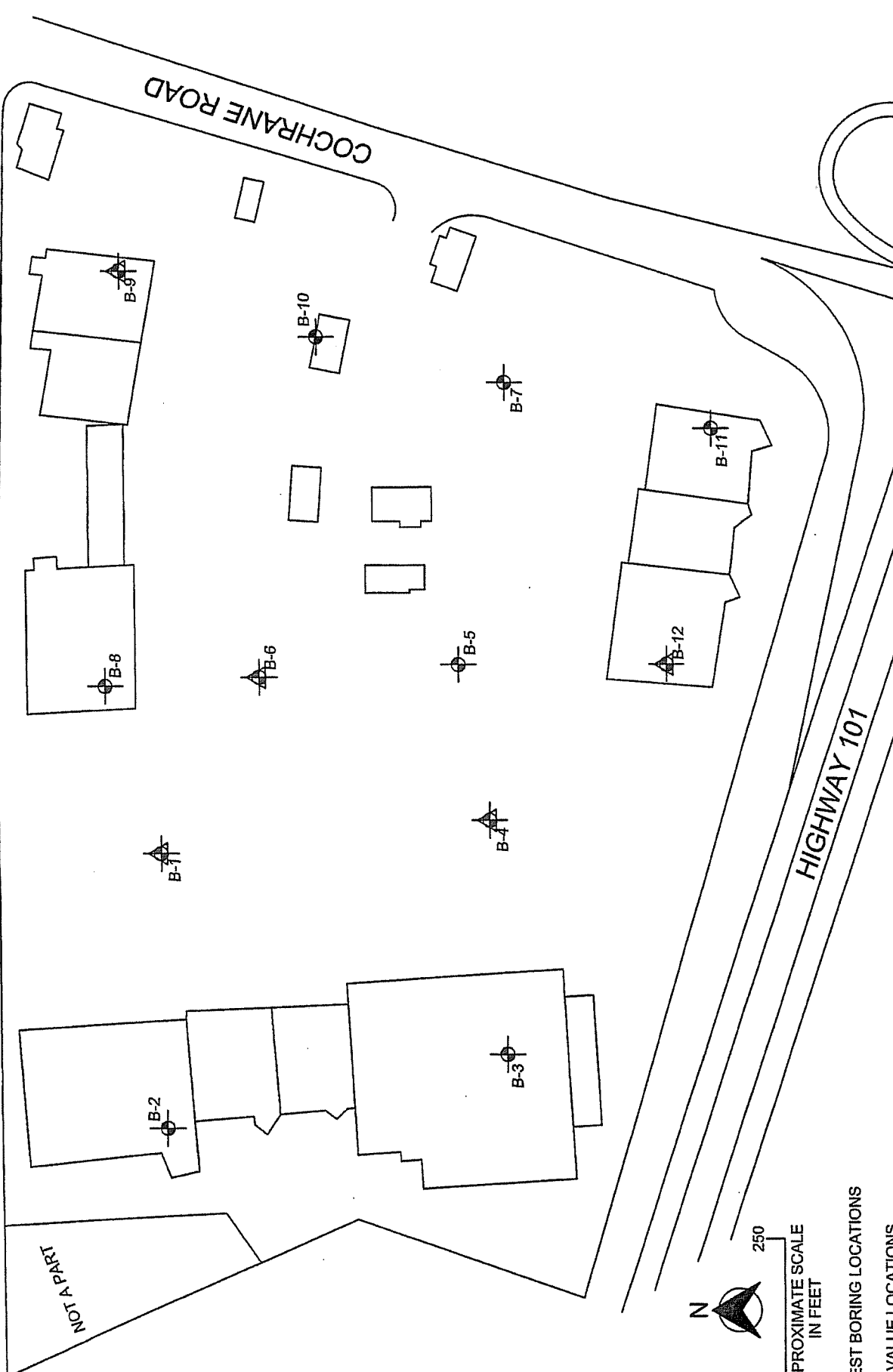
NOT A PART



0 250  
APPROXIMATE SCALE  
IN FEET

● TEST BORING LOCATIONS

△ R-VALUE LOCATIONS



TEST BORING AND R-VALUE LOCATION MAP  
PROPOSED BROWMAN DEVELOPMENT SHOPPING CENTER  
MORGAN HILL, CALIFORNIA

FILE NO.	07261-03-02	DATE DRAWN:	10/06/04
DRAWN BY:	WME	APPROVED BY:	
PROJECT NO.	A07261.03	DRAWING NO.	2



## **APPENDIX B**

### **LOGS OF BORINGS**

This appendix contains the final logs of borings. These logs represent our interpretation of the contents of the field logs and the results of the field and laboratory tests.

The boring logs and related information depict subsurface conditions only at these locations and at the particular time designated on the logs. Soil conditions at other locations may differ from conditions occurring at these test boring locations. Also, the passage of time may result in changes in the soil conditions at these test boring locations.

In addition, an explanation of the abbreviations used in the preparation of the logs and a description of the Unified Soil Classification System are provided at the end of Appendix B.





# SOIL TEST BORING SYMBOLIC LOG

BORING B-1

Project: Proposed Retail Shopping Center

Project Number: TL A07261.03

Location: Morgan Hill, CA

Date: 09/01/04

Logged By: D. Ledgerwood

Elevation: N/A

Drilled By: T. Conley

Depth to Groundwater: N/E

Drill Type: CME 75

Cased to Depth: N/A

Auger Type: 6 5/8" O.D. Hollow Stem Auger

Hammer Type: Trip

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-value	Moisture Content %
0	14/6 16/6 12/6	ML	SILT, Sandy; very stiff, damp, slight plasticity, light brown		28	3
5	26/6 28/6 29/6	CL	LEAN CLAY, Sandy; hard, damp, low plasticity, brown to olive brown, with coarse gravel		57	5
10	8/6 12/6 12/6	SM	SAND, Silty; medium dense, moist, fine to medium, brown, trace clay, trace fine subangular gravel Bottom of Boring at 10 Feet		24	8
15						
20						
25						
30						

Notes:

# SOIL TEST BORING SYMBOLIC LOG

BORING B-2

Project: Proposed Retail Shopping Center

Project Number: TL A07261.03

Location: Morgan Hill, CA

Date: 09/01/04

Logged By: D. Ledgerwood

Elevation: N/A

Drilled By: T. Conley

Depth to Groundwater: N/E

Drill Type: CME 75

Cased to Depth: N/A

Auger Type: 6 5/8" O.D. Hollow Stem Auger

Hammer Type: Trip

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-value	Moisture Content %
0		SM	SAND, Silty; dense, damp, fine, brown to reddish brown, with fine to coarse subangular gravel, trace clay	DD = 113 -4 = 35% -200 = 25%	—	5
5	16/6 19/6 18/6	GM	GRAVEL, Sandy; dense, damp, fine subangular, brown		37	5
			Increase in percent sand			
			Increase in coarse gravels			
10	7/6 11/6 12/6		Medium dense, moist, brown, increase in coarse sands		23	6
			Dense gravel layer encountered in drilling			
15	11/6 16/6 16/6		Dense, olive brown with dark reddish brown		32	10
20	7/6 12/6 20/6		Moist, brown, increase in fine subangular gravel	-4 = 35% -200 = 19%	32	9
25	9/6 14/6 16/6				30	9
			Bottom of Boring at 25 Feet			
30						

Notes:

# SOIL TEST BORING SYMBOLIC LOG

BORING B-3

Project: Proposed Retail Shopping Center

Project Number: TL A07261.03

Location: Morgan Hill, CA

Date: 09/01/04

Logged By: D. Ledgerwood

Elevation: N/A

Drilled By: T. Conley

Depth to Groundwater: N/E

Drill Type: CME 75

Cased to Depth: N/A

Auger Type: 6 5/8" O.D. Hollow Stem Auger

Hammer Type: Trip

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-value	Moisture Content %
0	6/6 10/6 13/6	ML	LEAN CLAY, Sandy; very stiff, damp, low plasticity, light brown, trace fine to coarse angular gravel	DD = 110 pcf -4 = 9% -200 = 58%	23	3
5	23/6 14/6 13/6	GM	GRAVEL, Sandy with Clay; medium dense, damp, fine to coarse, subangular, brown		27	5
10	23/6 28/6 33/6		Increase in gravels			
			Very dense, moist, some fine cobbles		51	5
15	10/6 11/6 12/6	GC GM	GRAVEL, Clayey; medium dense, moist, fine to coarse subangular, olive brown, with dark reddish brown clay lens	-4 = 45% -200 = 14%	23	11
20	21/6 34/6 21/6		Very dense, increase in coarse gravel, trace fine cobbles		55	5
25	14/6 18/6 23/6				41	1
30	10/6 16/6 20/6		Increase in cobbles		36	9

Notes:



# SOIL TEST BORING SYMBOLIC LOG

BORING B-3

Project: Proposed Retail Shopping Center

Location: Morgan Hill, CA

Logged By: D. Ledgerwood

Drilled By: T. Conley

Drill Type: CME 75

Auger Type: 6 5/8" O.D. Hollow Stem Auger

Project Number: TL A07261.03


Date: 09/01/04

Elevation: N/A

Depth to Groundwater: N/E

Cased to Depth: N/A

Hammer Type: Trip

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-value	Moisture Content %
35			Drill refusal at 34 Feet			
40						
45						
50						
55						
60						
65						

Notes:



# SOIL TEST BORING SYMBOLIC LOG

BORING B-4

Project: Proposed Retail Shopping Center

Project Number: TL A07261.03

Location: Morgan Hill, CA

Date: 09/01/04

Logged By: D. Ledgerwood

Elevation: N/A

Drilled By: T. Conley

Depth to Groundwater: N/E

Drill Type: CME 75

Cased to Depth: N/A

Auger Type: 6 5/8" O.D. Hollow Stem Auger

Hammer Type: Trip

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-value	Moisture Content %
0	8/6 15/6 13/6	ML	SILT, Sandy; very stiff, damp, non-plastic to low plastic, some fine gravel and cobbles, light brown		28	5
5	14/6 11/6 21/6	GM	GRAVEL, Sandy; dense, damp, fine subangular, brown		32	4
10	39/6 36/6 23/6		Increase in percentage of gravel, dark brown mottled with gray Bottom of Boring at 10 Feet		59	4
15						
20						
25						
30						

Notes:



# SOIL TEST BORING SYMBOLIC LOG

BORING B-5

Project: Proposed Retail Shopping Center

Project Number: TL A07261.03

Location: Morgan Hill, CA

Date: 09/01/04

Logged By: D. Ledgerwood

Elevation: N/A

Drilled By: T. Conley

Depth to Groundwater: N/E

Drill Type: CME 75

Cased to Depth: N/A

Auger Type: 6 5/8" O.D. Hollow Stem Auger

Hammer Type: Trip

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-value	Moisture Content %
0		SM	SAND, Silty; medium dense, damp, fine, some fine gravel, light brown to yellow orange		23	5
5		GM	GRAVEL, Sandy; dense, dry, fine subangular, light brown		40	2
10			Damp		32	6
15			Bottom of Boring at 11.5 Feet			
20						
25						
30						

Notes:



# SOIL TEST BORING SYMBOLIC LOG

BORING B-6

Project: Proposed Retail Shopping Center

Project Number: TL A07261.03

Location: Morgan Hill, CA

Date: 09/01/04

Logged By: D. Ledgerwood

Elevation: N/A

Drilled By: T. Conley

Depth to Groundwater: N/E

Drill Type: CME 75

Cased to Depth: N/A

Auger Type: 6 5/8" O.D. Hollow Stem Auger

Hammer Type: Trip

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-value	Moisture Content %
0	9/6 10/6 10/6	ML	SILT, Sandy; very stiff, damp, some fine subangular gravel, reddish brown		20	5
5	19/6 31/6 20/6	GM	GRAVEL, Sandy with Silt; very dense, damp, fine subangular gravel, light brown		51	5
10	12/6 29/6 27/6		some clay, light brown mottled with gray		56	5
			Bottom of Boring at 10 Feet			
15						
20						
25						
30						

Notes:



# SOIL TEST BORING SYMBOLIC LOG

BORING B-7

Project: Proposed Retail Shopping Center

Location: Morgan Hill, CA

Logged By: D. Ledgerwood

Drilled By: T. Conley

Drill Type: CME 75

Auger Type: 6 5/8" O.D. Hollow Stem Auger

Project Number: TL A07261.03

Date: 09/01/04

Elevation: N/A

Depth to Groundwater: N/E

Cased to Depth: N/A

Hammer Type: Trip

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-value	Moisture Content %
0		ML	SILT, Sandy; very stiff, slightly moist, non to low plastic, some clay, some fine subangular gravels, reddish brown		24	10
5			Hard, moist, dark brown mottled with tan and gray		37	10
10			Increase in percentage of gravel, yellow brown		46	7
			Bottom of Boring at 11.5 Feet			
15						
20						
25						
30						

Notes:



# SOIL TEST BORING SYMBOLIC LOG

BORING B-8

Project: Proposed Retail Shopping Center

Project Number: TL A07261.03

Location: Morgan Hill, CA

Date: 09/02/04

Logged By: B. Annis

Elevation: N/A

Drilled By: T. Conley

Depth to Groundwater: N/E

Drill Type: CME 75

Cased to Depth: N/A

Auger Type: 6 5/8" O.D. Hollow Stem Auger

Hammer Type: Trip

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-value	Moisture Content %
0		ML	SILT, Sandy; medium to fine grained, dry, slightly plastic, soft, light brown	DD = 109 pcf C = 95 psf $\phi = 34^\circ$	—	6
19/6 23/6 33/6		GM	GRAVEL, Cemented Sands; coarse to medium grained, very dense, non plastic, light gray		56	6
5		ML	SILT, Sandy; coarse to fine grained, dry, very stiff, oranges brown		23	4
27/6 13/6 10/6		GM	Gravels (3 to 1 inch thick), silt mixtures, medium dense, dry, light gray			
10			Decrease in gravel size		41	6
25/6 22/6 19/6						
15			Slightly plastic, moist, increase in clay content		34	4
25/6 18/6 16/6						
20		CL	CLAY, Sandy with Gravel; very stiff, moist, low plasticity, dark brown		24	8
12/6 14/6 10/6						
25			Hard, increase in cobbles (3 to 1 inch)		52	5
13/6 22/6 30/6						
			Bottom of Boring at 26.5 Feet			
30						

Notes:

# SOIL TEST BORING SYMBOLIC LOG

BORING B-9

Project: Proposed Retail Shopping Center

Project Number: TL A07261.03

Location: Morgan Hill, CA

Date: 09/02/04

Logged By: B. Annis

Elevation: N/A

Drilled By: T. Conley

Depth to Groundwater: N/E

Drill Type: CME 75

Cased to Depth: N/A

Auger Type: 6 5/8" O.D. Hollow Stem Auger

Hammer Type: Trip

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-value	Moisture Content %
0	22/6 26/6 28/6	ML	SILT, Sandy; fine grained, few gravel mixtures, dry, light orange brown, very stiff Increase in grain size to medium	DD = 108 pcf -4 = 7% -200 = 65%	-- 54	7 5
5	13/6 18/6 19/6	GM	GRAVEL, Sandy; dense, damp, fine subangular, some clay, light brown	-4 = 44% -200 = 17%	37	7
10	16/6 23/6 50/5				73	5
15	29/6 31/6 30/6		Decrease in gravel size to pea gravel, (fine gravel)		61	
20	23/6 50/5		Light gray Increase in gravel size to cobbles		>50	6
25	50/4	SM	SAND, Silty; medium to fine grained, gravel mixtures, slightly moist, very dense, slightly cemented, dark brown		>50	--
30	14/6 36/6 22/6	GC	GRAVEL, SANDy; medium dense, moist, fine to coarse, subangular, some clay  Increase in sands (medium to coarse grained)		58	9

Notes:



# SOIL TEST BORING SYMBOLIC LOG

BORING B-9

Project: Proposed Retail Shopping Center

Project Number: TL A07261.03

Location: Morgan Hill, CA

Date: 09/02/04

Logged By: B. Annis

Elevation: N/A

Drilled By: T. Conley

Depth to Groundwater: N/E

Drill Type: CME 75

Cased to Depth: N/A

Auger Type: 6 5/8" O.D. Hollow Stem Auger

Hammer Type: Trip

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-value	Moisture Content %
35	25/6 21/6 22/6		Decrease in sands, increase in clay content		43	9
40	19/6 29/6 29/6				58	11
45	21/6 35/6 50/5	GM	GRAVEL, Sandy; very dense, moist, subangular, olive brown		85	12
50	10/6 15/6 22/6		Increase in clay content		37	11
55			Bottom of Boring at 51.5 Feet			
60						
65						

Notes:

Figure Number B-9



# SOIL TEST BORING SYMBOLIC LOG

BORING B-10

Project: Proposed Retail Shopping Center

Project Number: TL A07261.03

Location: Morgan Hill, CA

Date: 09/02/04

Logged By: B. Annis

Elevation: N/A

Drilled By: T. Conley

Depth to Groundwater: N/E

Drill Type: CME 75

Cased to Depth: N/A

Auger Type: 6 5/8" O.D. Hollow Stem Auger

Hammer Type: Trip

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-value	Moisture Content %
0		ML	SILT; little or no sands, fine grained, slightly moist, stiff, light brown			8
	6/6 7/6 11/6		Increase in clay content, slightly plastic, very stiff		18	14
5						
	13/6 16/6 12/6	GM	medium dense, moist, fine to coarse subangular, olive brown		28	7
10						
	13/6 16/6 17/6		Brown		33	7
15						
	14/6 18/6 42/6	ML	SILT, Sandy; hard, moist, slightly plastic, some fine to coarse subangular gravel, dark olive brown		60	7
20						
	9/6 21/6 26/6	SM	SAND, Silty; gravels, dense, moist, fine to medium, angular gravels, some clay, orangish brown		47	6
25			Bottom of Boring at 25 Feet			
30						

Notes:

Figure Number B-10



# SOIL TEST BORING SYMBOLIC LOG

BORING B-11

Project: Proposed Retail Shopping Center

Project Number: TL A07261.03

Location: Morgan Hill, CA

Date: 09/021/04

Logged By: B. Annis

Elevation: N/A

Drilled By: T. Conley

Depth to Groundwater: N/E

Drill Type: CME 75

Cased to Depth: N/A

Auger Type: 6 5/8" O.D. Hollow Stem Auger

Hammer Type: Trip

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-value	Moisture Content %
0		CL	LEAN CLAY, Sandy; dry, low plasticity, some fine subangular gravel, light brown	DD = 103 pcf C = 0 psf $\phi = 38^\circ$	--	4
5	12/6 16/6 15/6	GC	GRAVEL, Clayey; dense, dry, fine subangular, light olive brown		31	3
10	12/6 9/6 20/6				29	5
15	11/6 18/6 20/6				38	7
20	9/6 22/6 37/6				59	7
25	9/6 15/6 12/6				27	10
			Bottom of Boring at 25 Feet			
30						

Notes:

Figure Number B-11



# SOIL TEST BORING SYMBOLIC LOG

BORING B-12

Project: Proposed Retail Shopping Center

Project Number: TL A07261.03

Location: Morgan Hill, CA

Date: 09/021/04

Logged By: B. Annis

Elevation: N/A

Drilled By: T. Conley

Depth to Groundwater: N/E

Drill Type: CME 75

Cased to Depth: N/A

Auger Type: 6 5/8" O.D. Hollow Stem Auger

Hammer Type: Trip

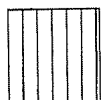
ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-value	Moisture Content %
0		SM	SAND, Silty; medium to fine grained, some angular gravels, dense, light brown Increase gravel		40	5
5		GM	GRAVEL, Sandy; damp, fine subangular, light brown	DD = 125 pcf	--	7
10			Medium dense, increase in clay content		28	7
15					27	6
20			Cobbles encountered		39	6
22			Drill refusal at 22 Feet			

Notes:

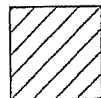
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Symbol Description

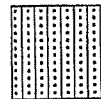
## Strata symbols



SILT, Sandy (ML)



LEAN CLAY (CL)



SAND, Silty (SM)

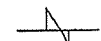


GRAVEL, Silty (GM)



GRAVEL, Clayey (GC)

## Misc. Symbols



Boring continues

Symbol Description



Drill rejection

## Soil Samplers



Standard penetration test



California Modified  
split barrel ring  
sampler

## Notes:

1. Test borings were drilled on 02/09/04 and 02/11/04 using a CME 75 equipped with Hollow Stem Auger.
2. Groundwater was encountered during excavation of the test borings.
3. Test boring locations were located by measuring wheel with reference to the existing site features.
4. These logs are subject to the limitations, conclusions, and recommendations in this report.
5. Results of tests conducted on samples recovered are reported on the logs. Abbreviations used are:

DD =	Natural dry density	LL =	Liquid limit (%)
UC =	Unconfined compression (psf)	PI =	Plasticity index (%)
-4 =	Percent passing #4 sieve (%)	pH =	Soil pH
-200 =	Percent passing #200 sieve (%)	SS =	Soluble sulfates (%)
SR =	Soil resistivity (ohm-cm)	Cl =	Soluble chlorides (%)
c =	Cohesion (psf)	ø =	Angle of internal friction (degrees)
TS =	Field Torvane Shear Strength test (tsf)	N/A =	Not applicable
		N/E =	None encountered

**APPENDIX C****RESULTS OF LABORATORY TESTS**

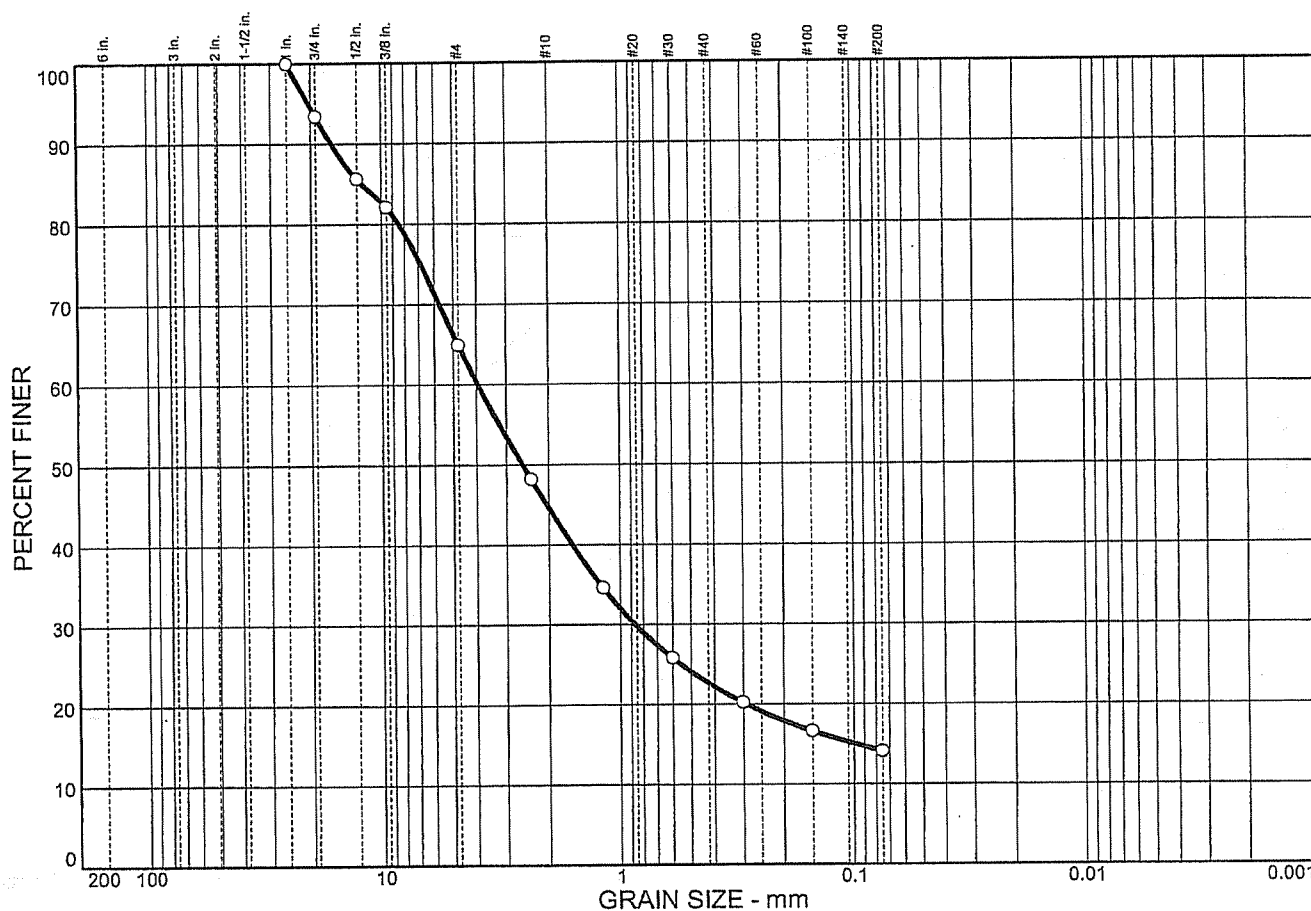
This appendix contains the individual results of the following tests. The results of the moisture content and dry density tests are included on the test boring logs in Appendix B. These data, along with the field observations, were used to prepare the final test boring logs in Appendix B.

These Included:	Number of Tests:	To Determine:
Natural Moisture (ASTM D2216)	63	Moisture contents representative of field conditions at the time the sample was taken.
Natural Density (ASTM D2216)	6	Dry unit weight of sample representative of in-situ or in-place undisturbed condition.
Direct Shear (ASTM D3080)	2	Soil shearing strength under varying loads and/or moisture conditions.
Consolidation (ASTM D2435)	2	The amount and rate at which a soil sample compresses when loaded, and the influence of saturation on its behavior.
R-Value (ASTM D2844)	2	The capacity of a subgrade or subbase to support a pavement section designed to carry a specified traffic load.
Moisture-Density Relationship (ASTM D1557)	1	The optimum (best) moisture content for compacting soil and the maximum dry unit weight (density) for a given compactive effort.



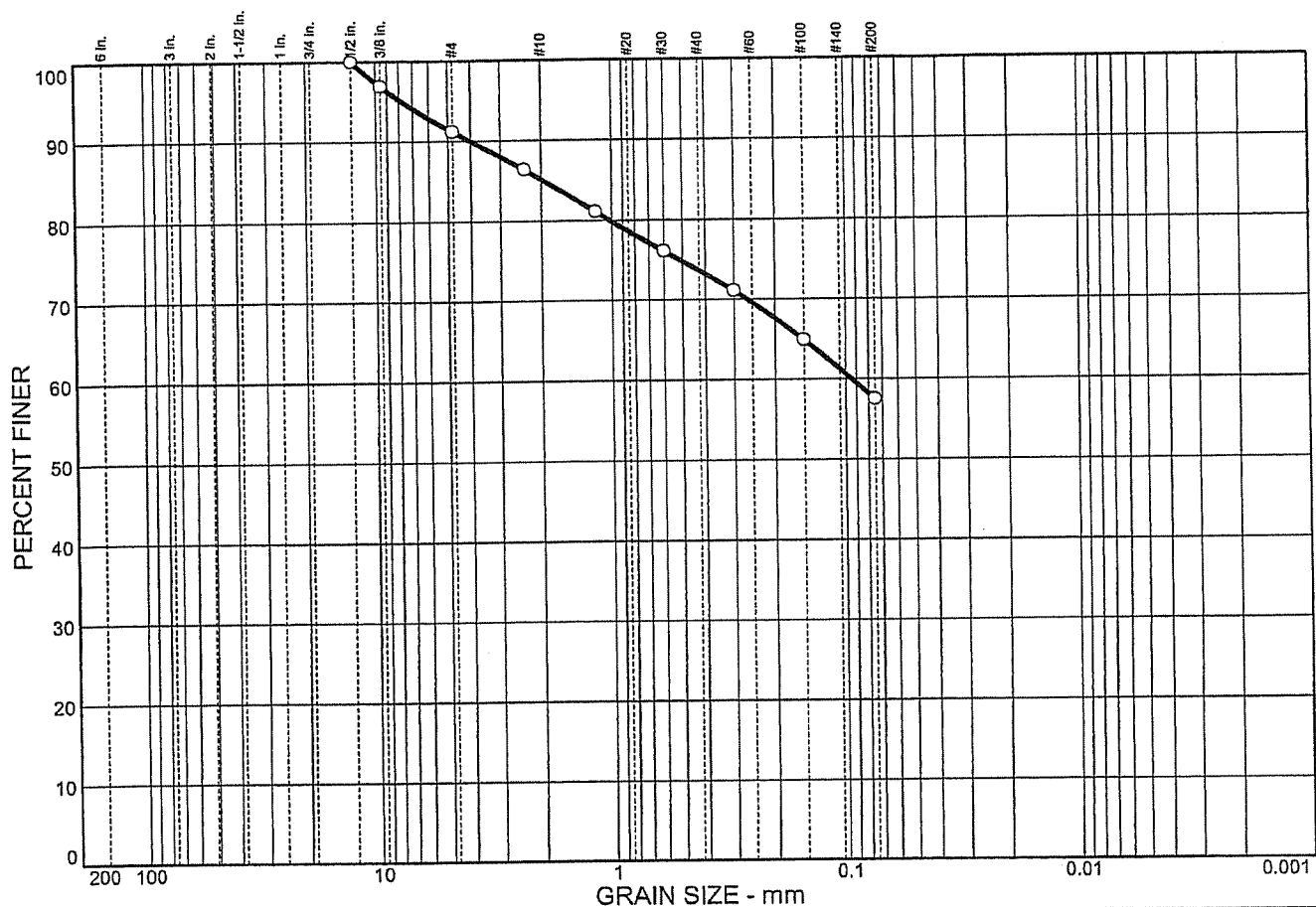
These Included:	Number of Tests:	To Determine:
Atterberg Limits (ASTM D4318)	2	The consistency and "stickiness," as well as the range of moisture contents within which the material is "workable."
Expansion Index (UBC (29-2) content.	2	Swell potential of soil with increases in moisture content.
Sulfate Content (ASTM D4327)	1	Percentage of water-soluble sulfate as (SO <sub>4</sub> ) in soil samples. Used as an indication of the relative degree of sulfate attack on concrete and for selecting the cement type.
Chloride Content (ASTM D4327)	1	Percentage of soluble chloride in soil. Used to evaluate the potential attack on encased reinforcing steel.
Resistivity (ASTM D1125)	1	The potential of the soil to corrode metal.
pH (ASTM D4972)	1	The acidity or alkalinity of subgrade material.





% + 3"	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
○ 0.0	6.6	28.5	20.2	22.0	8.6	14.1	

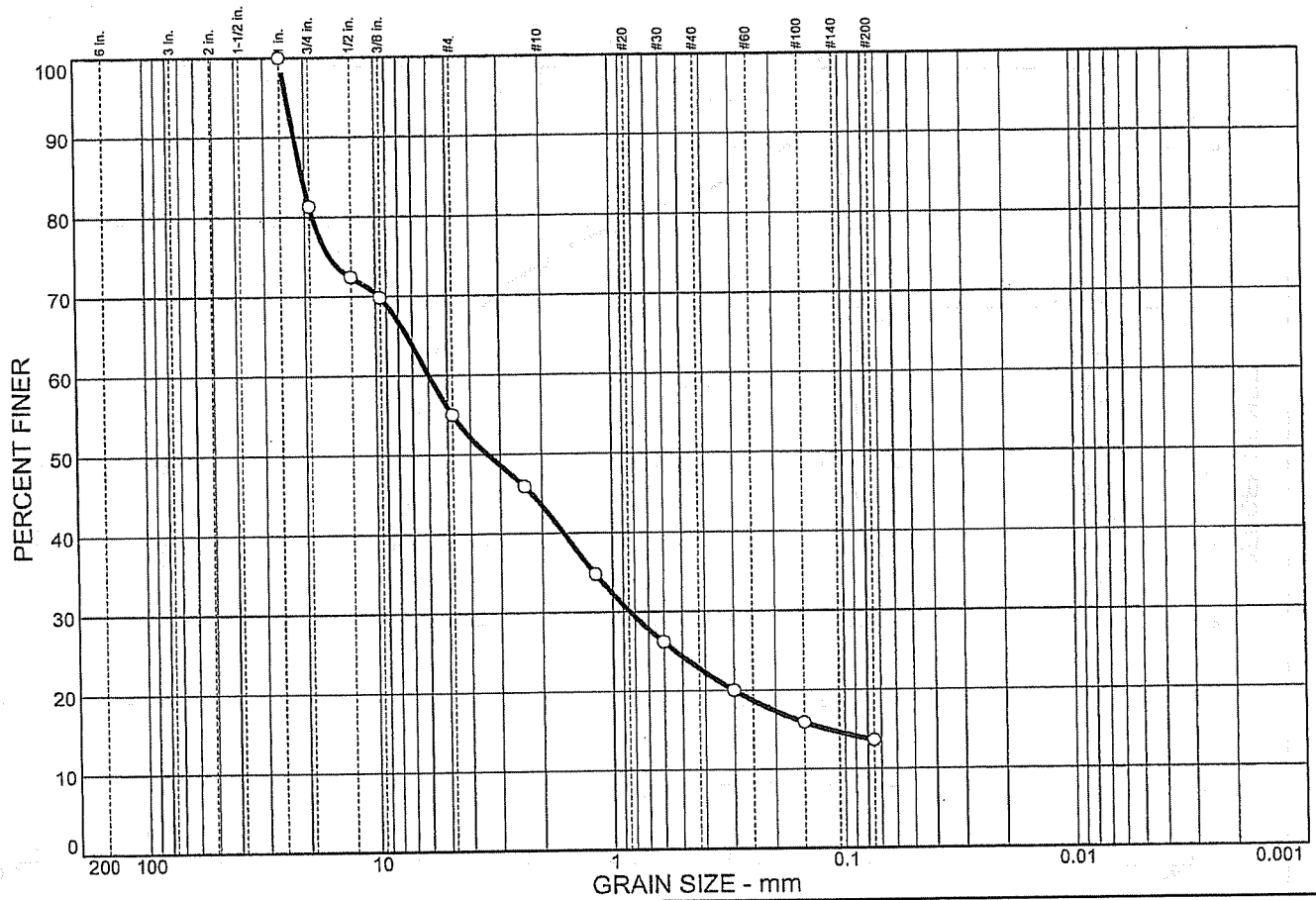
SOIL DATA					
SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	DESCRIPTION	USCS
○	B-2		18.5	SAND, silty	SM

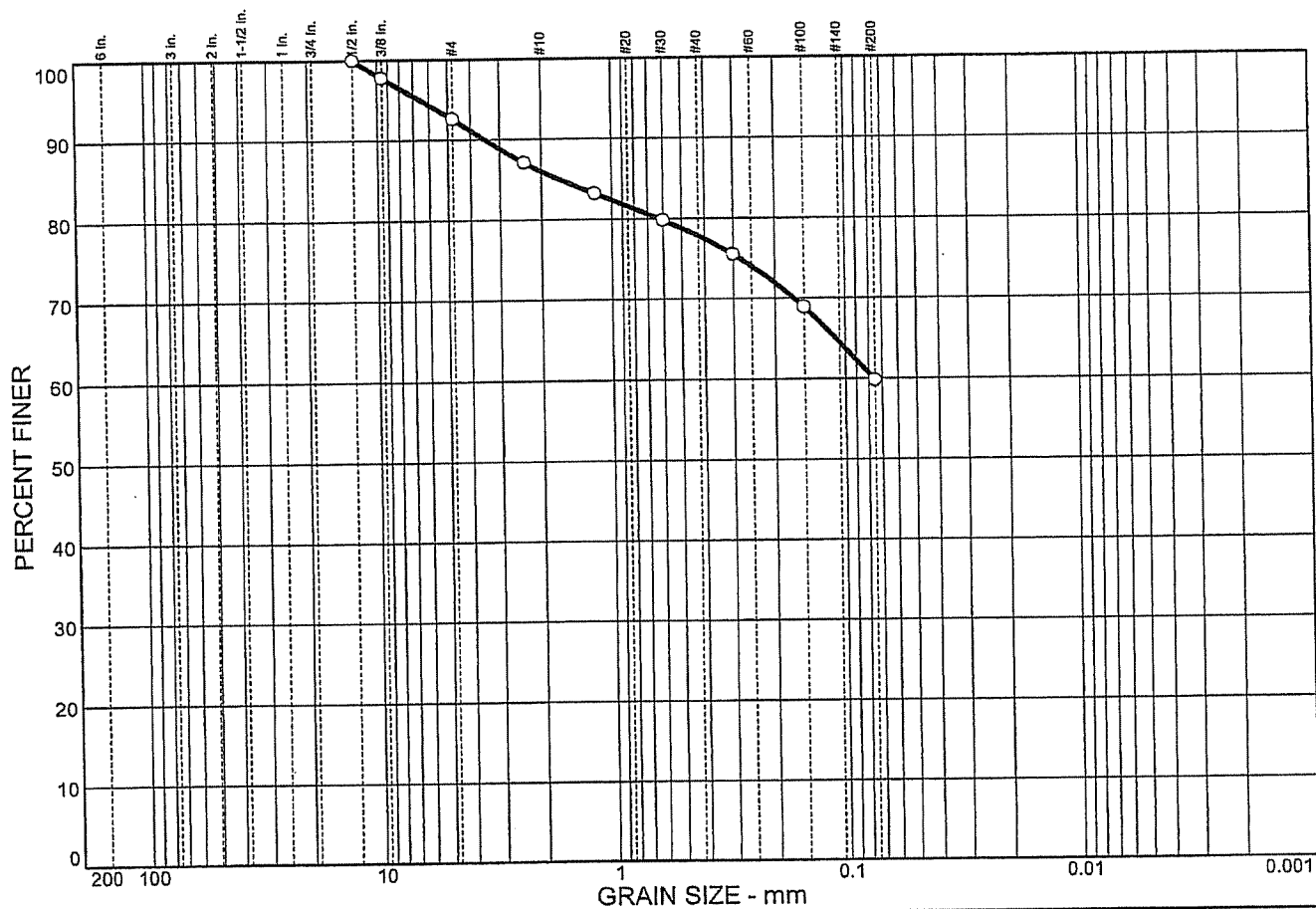


% + 3"	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	8.8	6.0	11.5	16.2	57.5	

SOIL DATA					
SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	DESCRIPTION	USCS
○	B-3		0	LEAN CLAY, Sandy; very stiff, damp, low plasticity, light brown, trace fine to coarse angular gravel	ML

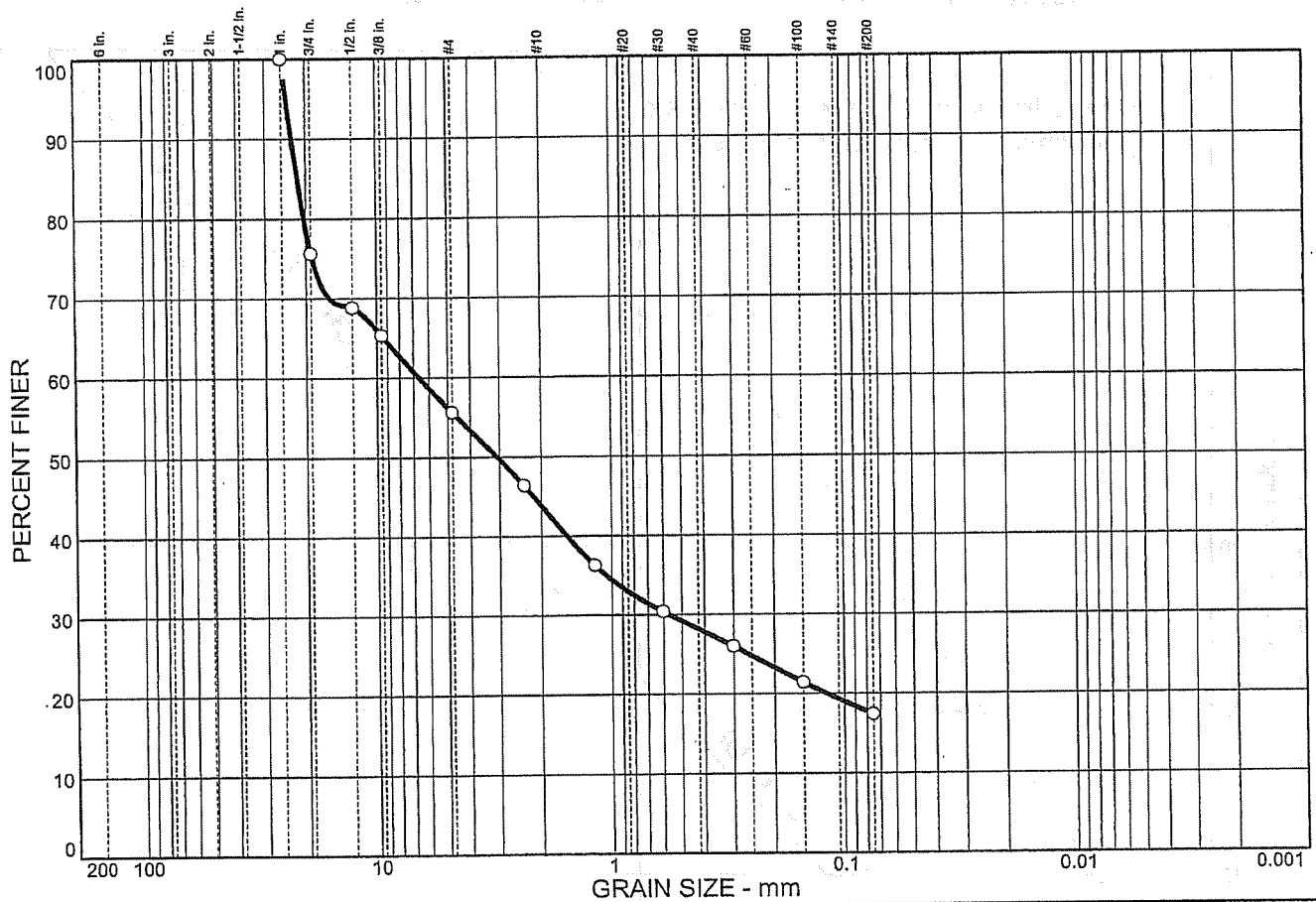
THE TWINING LABORATORIES, INC.	Client: Browman Development
	Project: Proposed Browman Development Shopping Center
	Project No.: A07261.03
	Figure No.



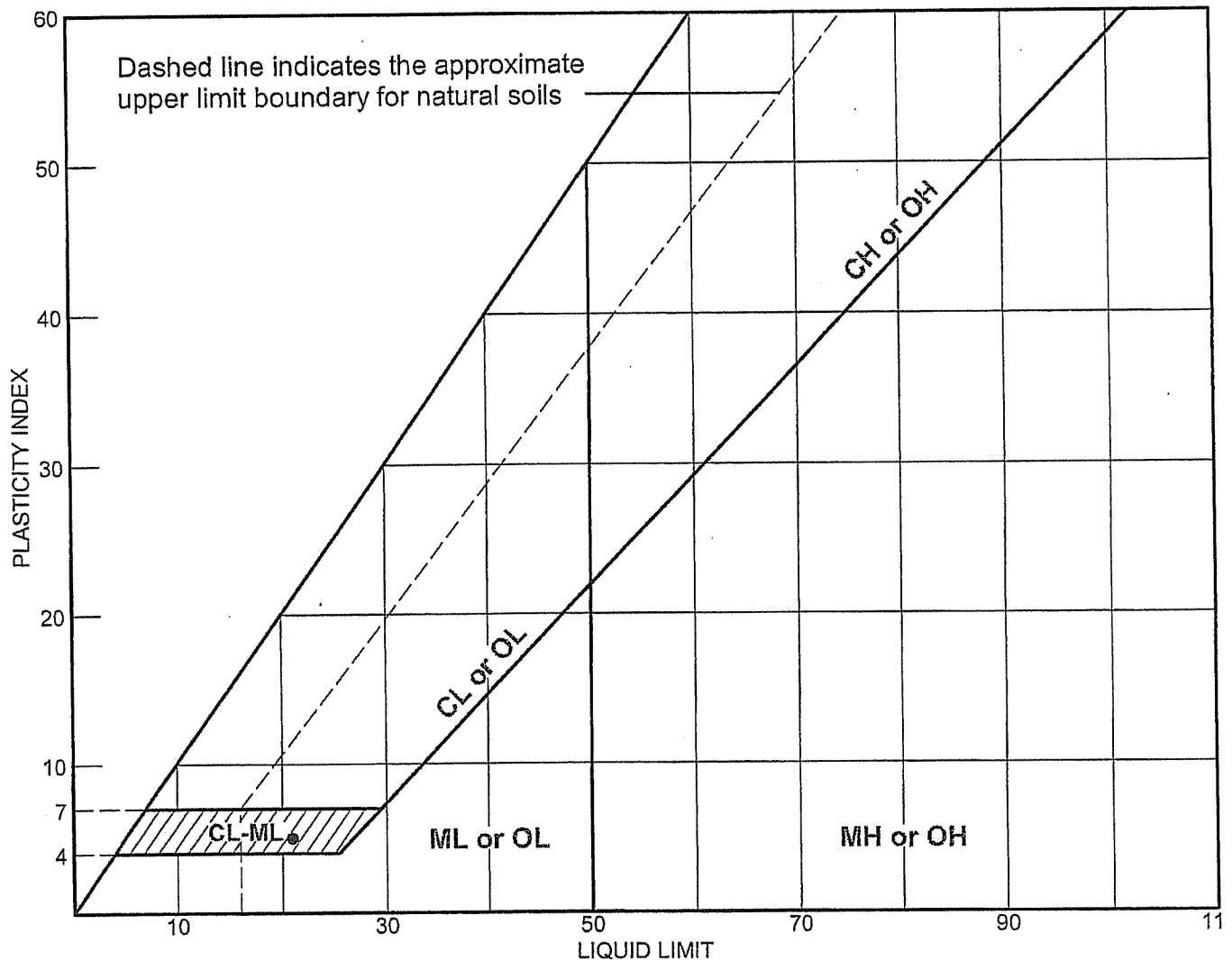


% + 3"	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0	0.0	7.4	6.6	8.2	18.0	59.8	

SOIL DATA					
SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	DESCRIPTION	USCS
○	B-9		0	SILT, Sandy; fine grained, few gravel mixtures, dry, light orange	ML
				brown, very stiff	



# LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA								
SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
•	B-8		0		16	21	5	ML

LIQUID AND PLASTIC LIMITS TEST REPORT

THE TWINING LABORATORIES, INC.

Client: Browman Development

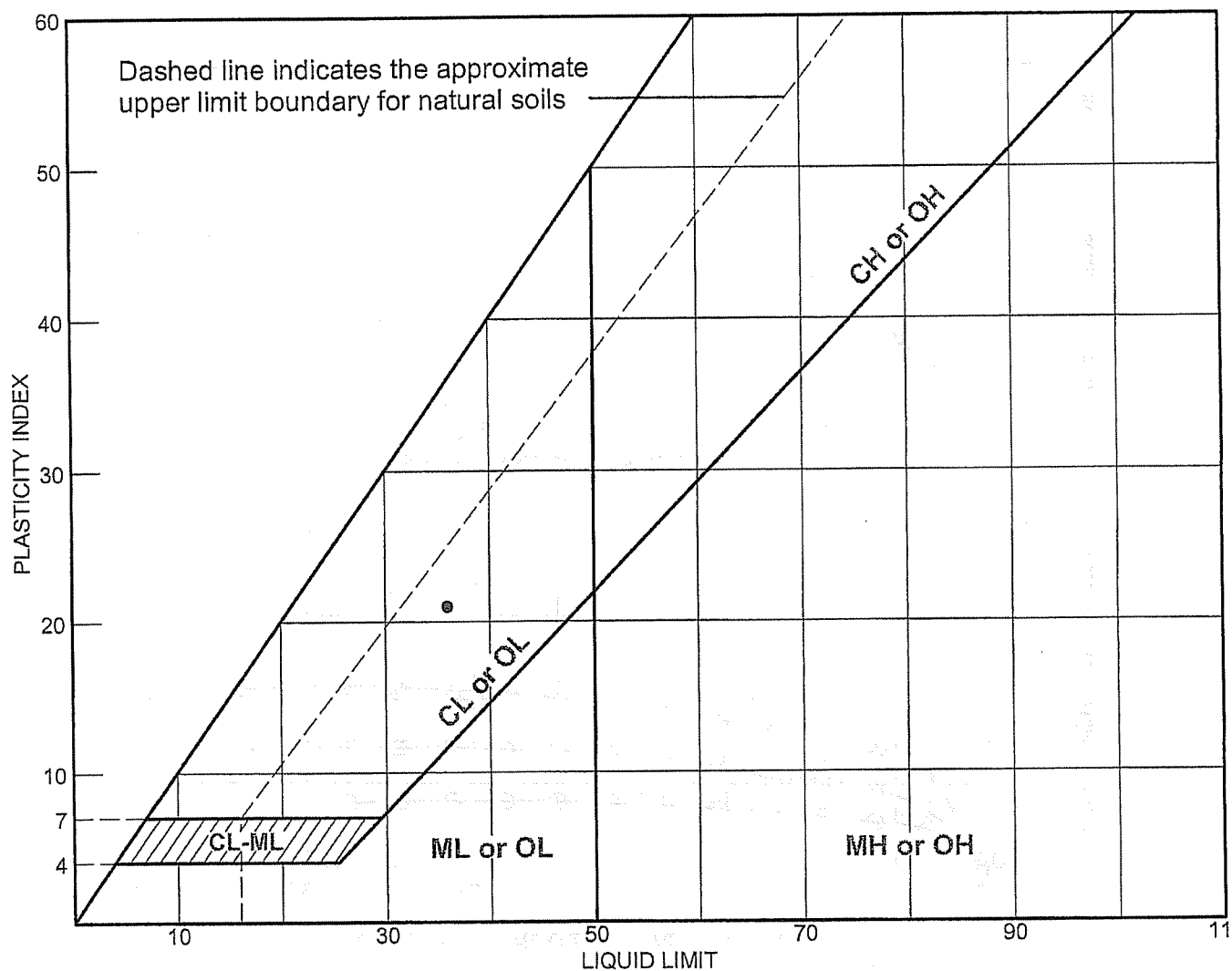
Project: Proposed Browman Development Shopping Center

Project No.: A07261.03

Figure No.



# LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA								
SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
•	B-11		1.5		15	36	21	

LIQUID AND PLASTIC LIMITS TEST REPORT

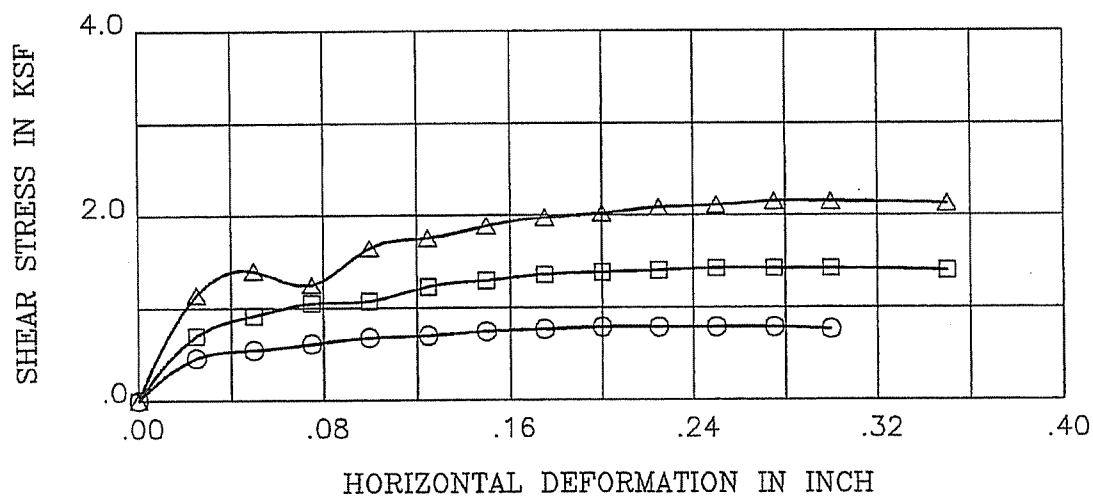
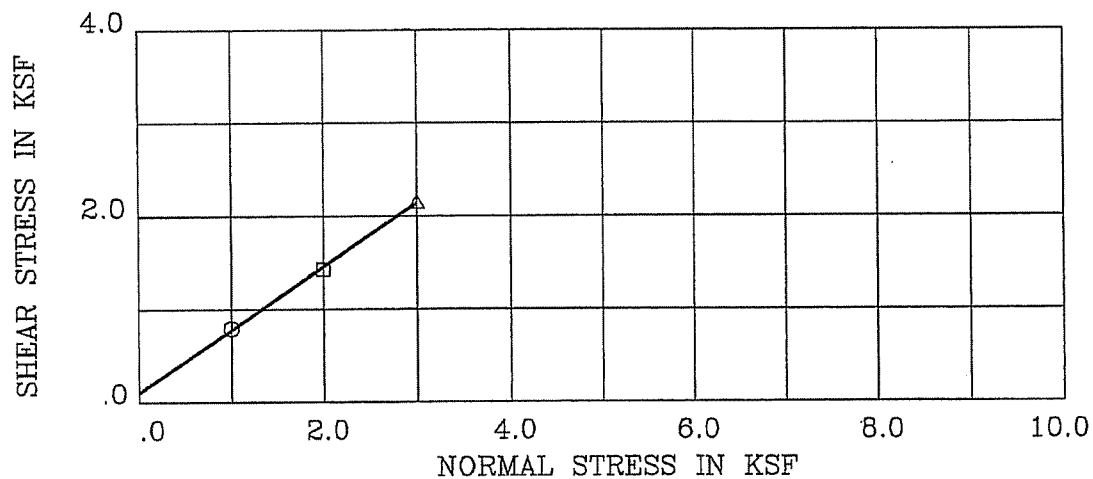
THE TWINING LABORATORIES, INC.

Client: Browman Development

Project: Proposed Browman Development Shopping Center

Project No.: A07261.03

Figure No.

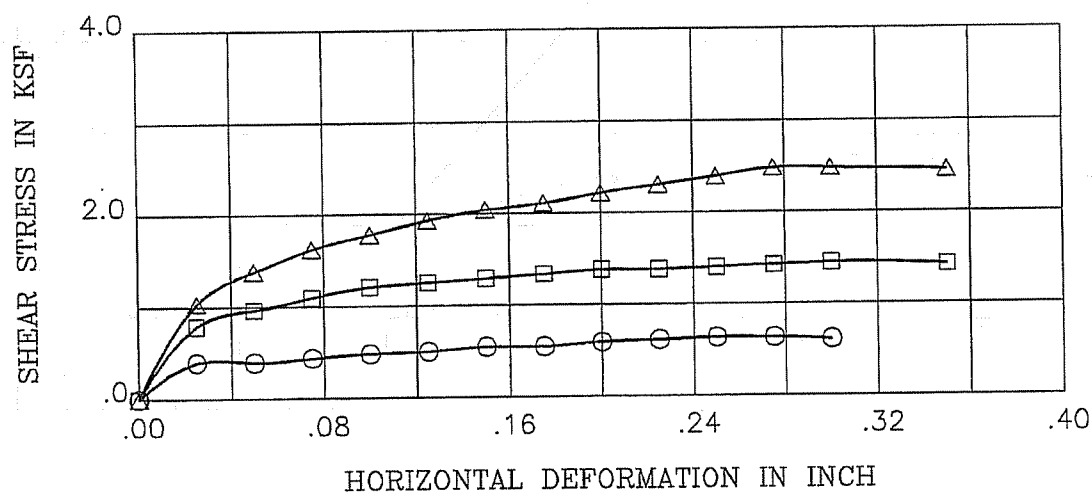
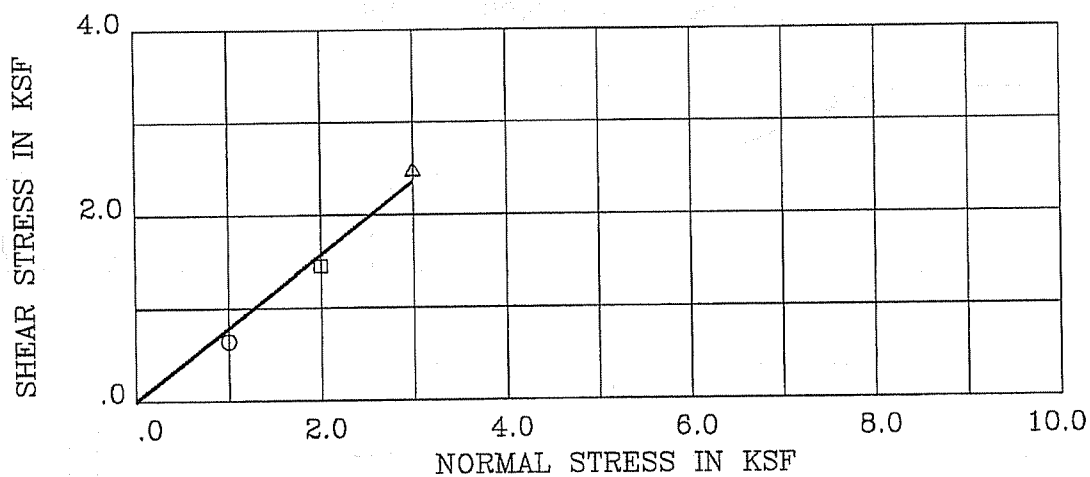


BORING/SAMPLE : B-8 DEPTH (ft) : 0 - 1.5'  
 DESCRIPTION :  
 STRENGTH INTERCEPT (C) : .095 KSF (PEAK STRENGTH)  
 FRICTION ANGLE (PHI) : 34.3 DEG

SYMBOL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	VOID RATIO	NORMAL STRESS (ksf)	PEAK SHEAR (ksf)	RESIDUAL SHEAR (ksf)
○	19.9	105.7	.565	1.00	.79	.77
□	20.9	110.4	.498	2.00	1.43	1.40
△	21.1	109.4	.512	3.00	2.16	2.13

Remark :

Proj A07261.03	Browman Morgan Hill
The Twining Labs Inc. Fresno, CA	DIRECT SHEAR TEST Figure No.

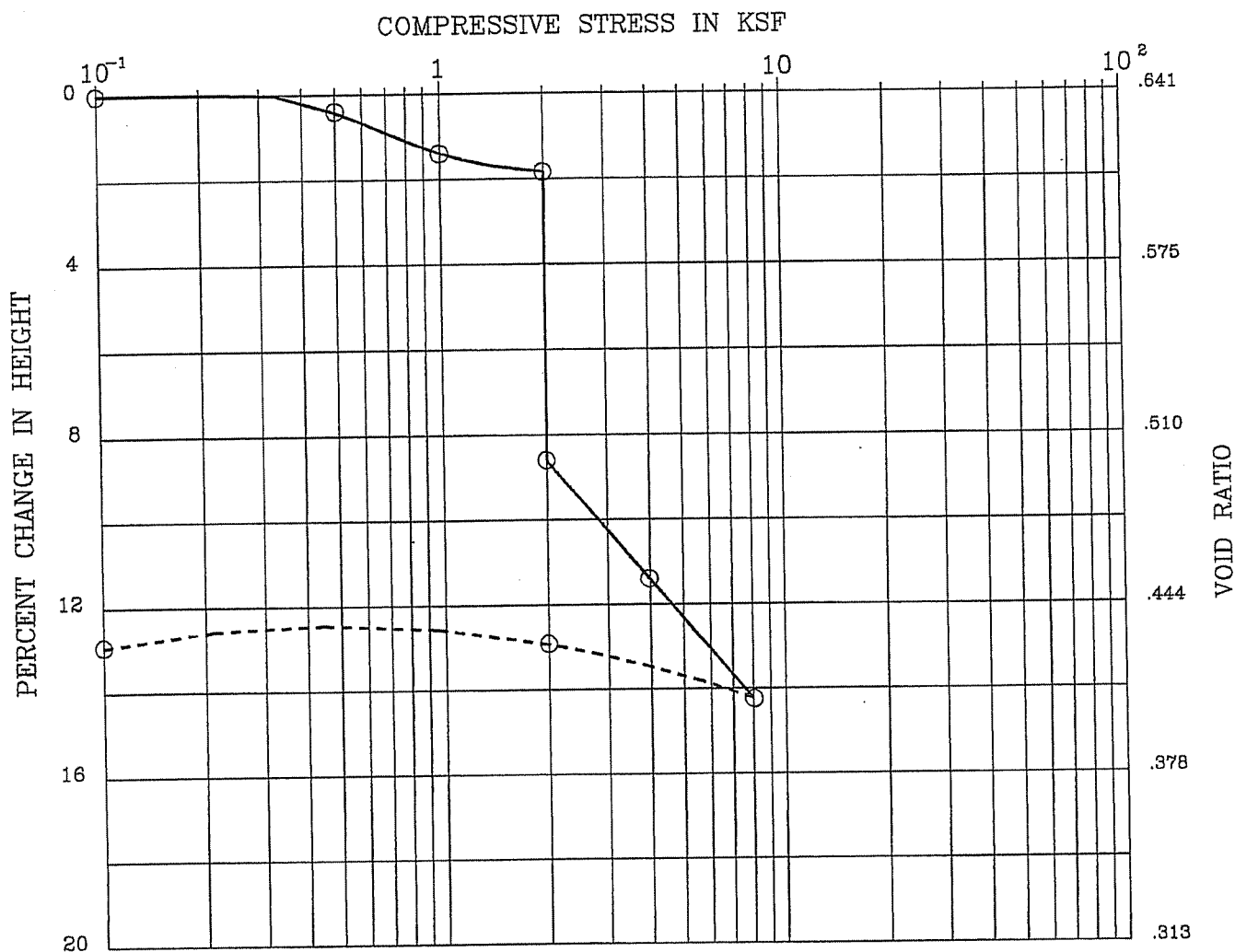


BORING/SAMPLE : B-11 DEPTH (ft) : 1.5 - 3.0'  
 DESCRIPTION :  
 STRENGTH INTERCEPT (C) : .000 KSF (PEAK STRENGTH)  
 FRICTION ANGLE (PHI) : 38.2 DEG

SYMBOL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	VOID RATIO	NORMAL STRESS (ksf)	PEAK SHEAR (ksf)	RESIDUAL SHEAR (ksf)
○	18.8	93.8	.762	1.00	.64	.61
□	18.4	102.8	.609	2.00	1.45	1.43
△	18.8	99.2	.667	3.00	2.49	2.46

Remark :

Proj A07261.03	Browman Morgan Hill
The Twining Labs Inc. Fresno, CA	DIRECT SHEAR TEST Figure No.



BORING : B-8  
 DEPTH (ft) : 0 - 1.5'  
 SPEC. GRAVITY : 2.65

DESCRIPTION :  
 LIQUID LIMIT :  
 PLASTIC LIMIT :

	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	PERCENT SATURATION	VOID RATIO
INITIAL	7.6	100.9	32	.641
FINAL	16.0	115.8	99	.429

Remark : Saturated at 2 kfs

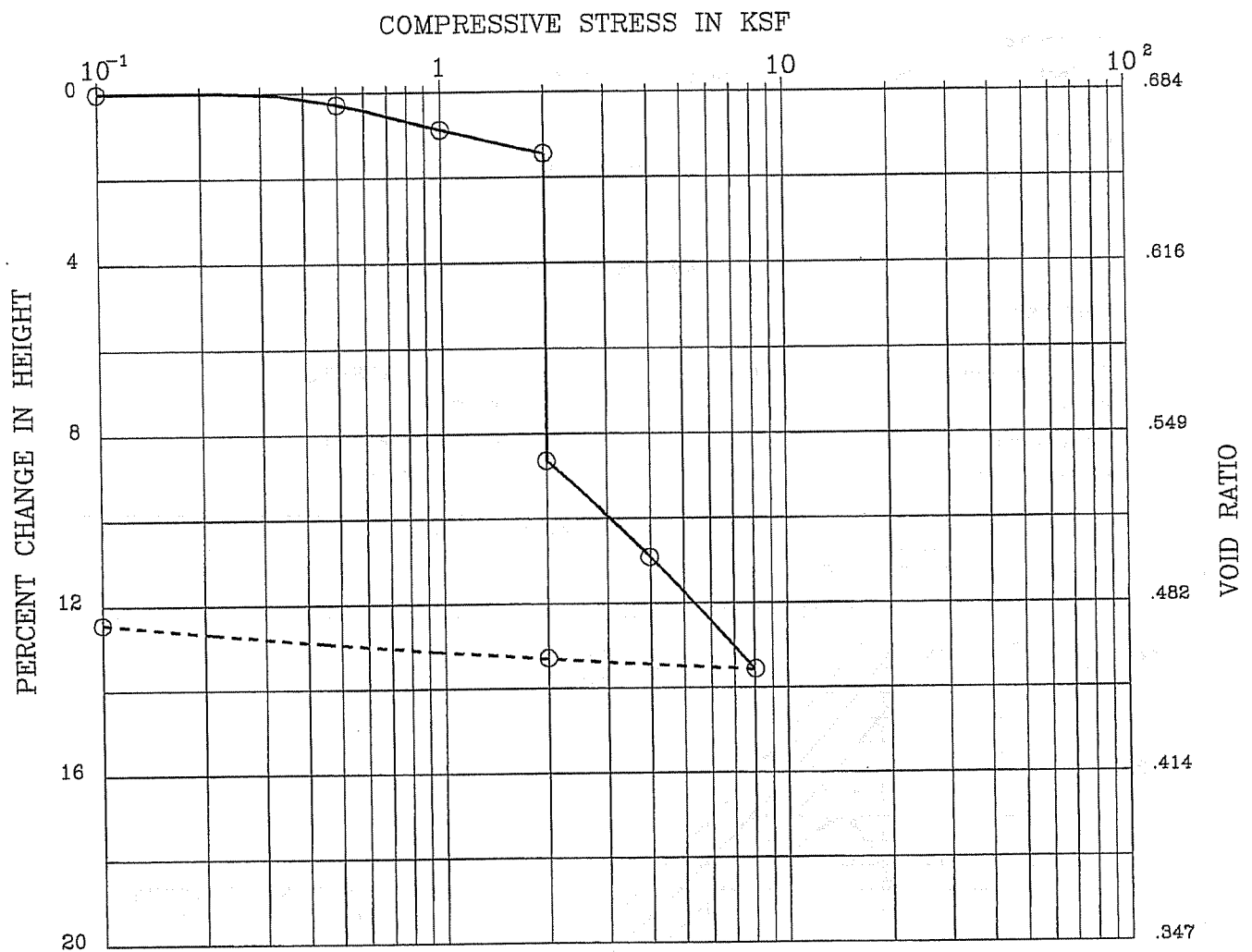
Proj A07261.03

Browman Morgan Hill

The Twining  
 Labs Inc.  
 Fresno, CA

CONSOLIDATION TEST

Figure No.



BORING : B-9  
 DEPTH (ft) : 0 - 1.5'  
 SPEC. GRAVITY : 2.65

DESCRIPTION :  
 LIQUID LIMIT :  
 PLASTIC LIMIT :

	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	PERCENT SATURATION	VOID RATIO
INITIAL	7.6	98.3	30	.684
FINAL	16.5	112.4	93	.473

Remark : Saturated at 2 kfs

Proj A07261.03	Browman Morgan Hill		
The Twining Labs Inc. Fresno, CA	CONSOLIDATION TEST		Figure No.

# COMPACTION TEST REPORT

Project No.: A07261.03

Date:

Project: Proposed Browman Development Shopping Center

Location: B-12

Elev./Depth: 0.5 - 3.0'

Sample No. Bulk Sample

Remarks:

## MATERIAL DESCRIPTION

Description:

Classifications -

USCS:

AASHTO:

Nat. Moist. =

Sp.G. =

Liquid Limit =

Plasticity Index =

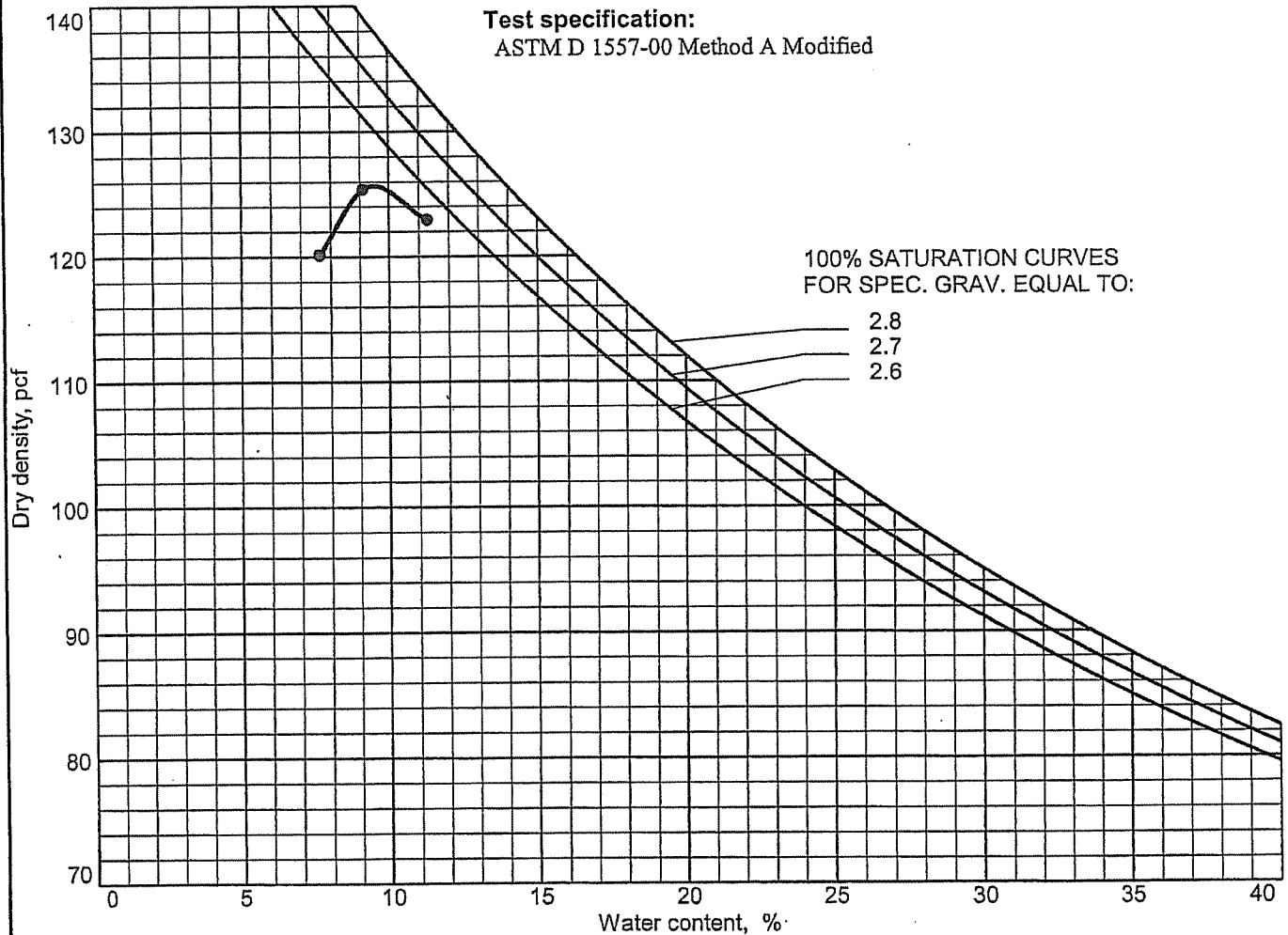
% > No.4 = %

% < No.200 =

## TEST RESULTS

Maximum dry density = 125.7 pcf

Optimum moisture = 9.5 %



## EXPANSION INDEX TEST

### Uniform Building Code (UBC) 29-2

Project Number: A07261.03

Project: Browman Development

Sample Location: B-1

Depth: 0.5 - 3.0

Date Sampled: \_\_\_\_\_

Sampled by: \_\_\_\_\_

Sample Number	Molding Moisture Content	Final Moisture Content	Dry Density (γ <sub>d</sub> )
	8.2	11.7	117.7

Initial Thickness: 1.0000

Final Thickness: 1.0109

Expansion Index (EI): 11

Expansion Soil Classification: Very Low

TABLE NUMBER 29-C  
EXPANSIVE SOIL CLASSIFICATION

Expansion Index	Potential Expansion
0-20	Very Low
21-50	Low
51-90	Medium
91-130	High
Above 130	Very High

Figure No.

## EXPANSION INDEX TEST

Uniform Building Code (UBC) 29-2

Project Number: A07261.03

Project: Browman Development

Sample Location: B-12

Depth: 0 - 3.0

Date Sampled:

Sampled by: Barry Annis

Sample Number	Molding Moisture Content	Final Moisture Content	Dry Density ( $\gamma_d$ )
	7.2	11.1	120.23

Initial Thickness: 1.0000

Final Thickness: 1.0231

Expansion Index (EI): 23

Expansion Soil Classification: Low

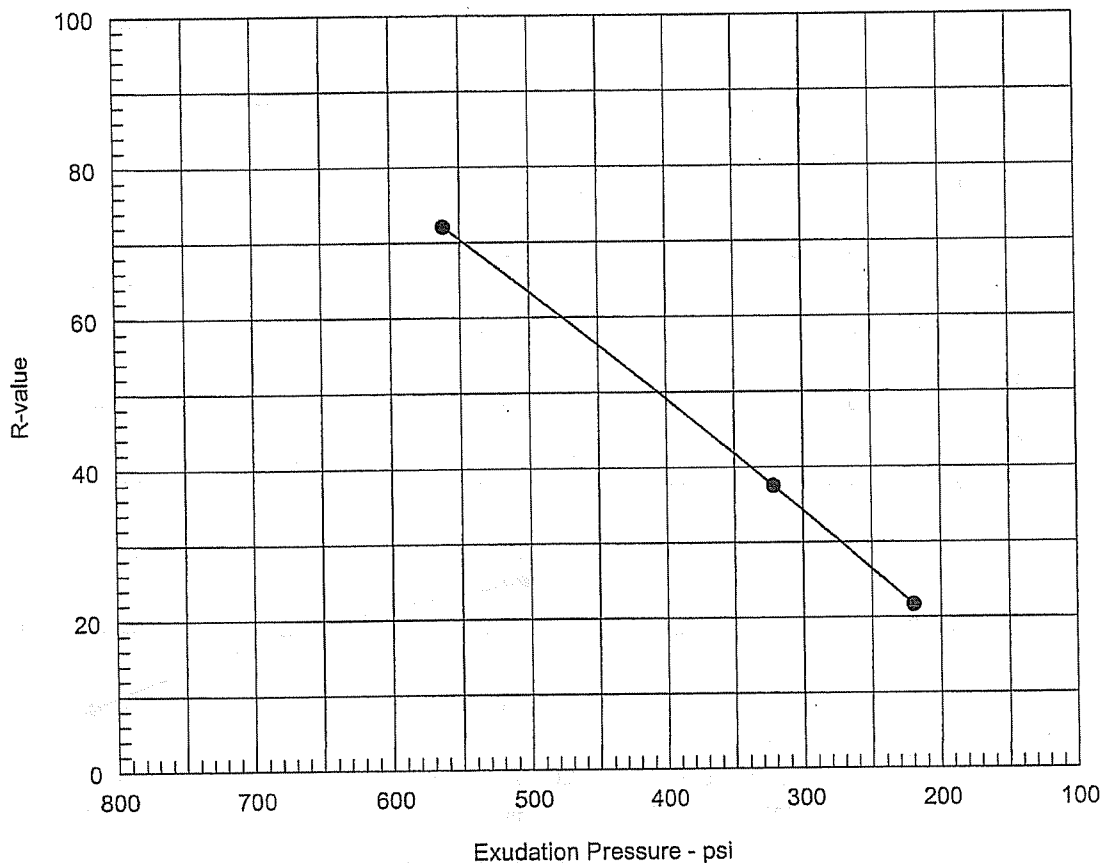
TABLE NUMBER 29-C  
EXPANSIVE SOIL CLASSIFICATION

Expansion Index	Potential Expansion
0-20	Very Low
21-50	Low
51-90	Medium
91-130	High
Above 130	Very High

Figure No.



# R-VALUE TEST REPORT

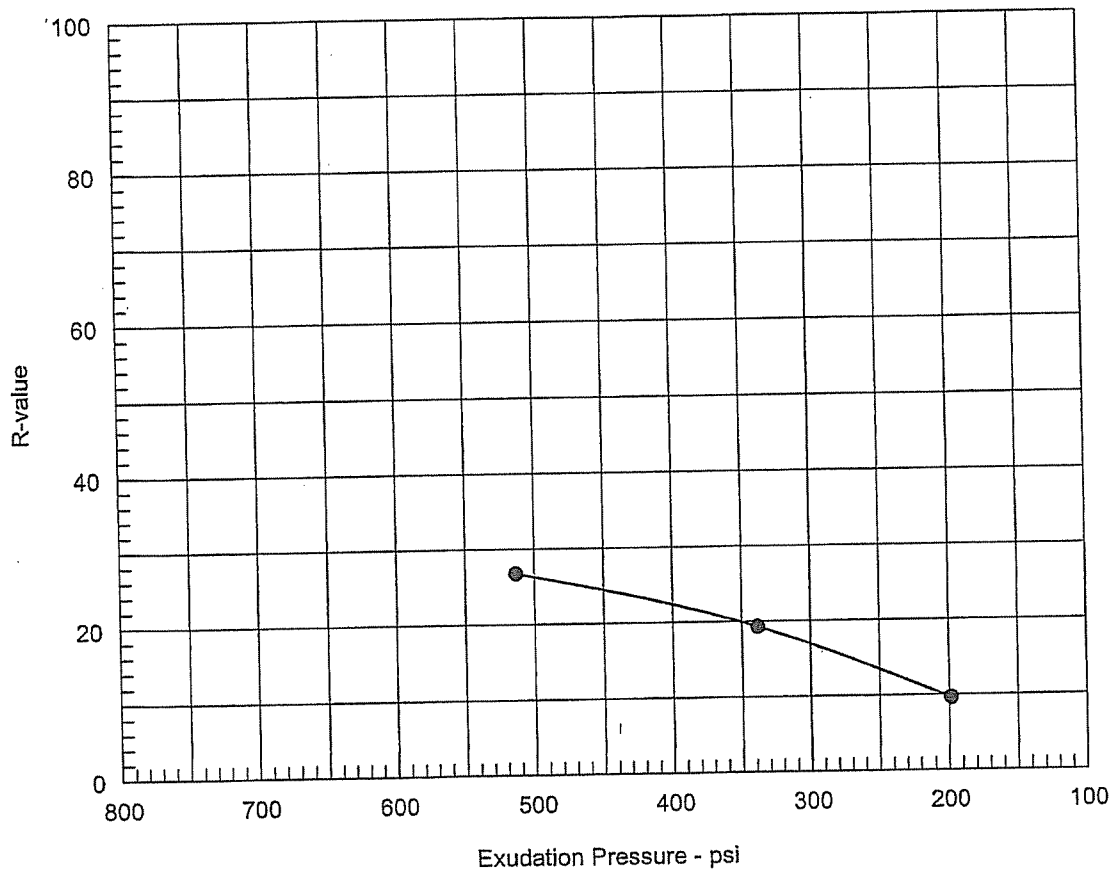


Resistance R-Value and Expansion Pressure - Cal Test 301

No.	Compact. Pressure psi	Density pcf	Moist. %	Expansion Pressure psi	Horizontal Press. psi @ 160 psi	Sample Height in.	Exud. Pressure psi	R Value	R Valu Cor
1	275	132.4	5.8	0.00	74	2.44	321	39.0	37.
2	160	130.7	6.3	0.00	97	2.45	220	21.7	21.
3	350	133.6	5.5	0.00	30	2.50	562	72.1	72.

Test Results	Material Description
R-value at 300 psi exudation pressure = 34.2	
Project No.: A07261.03 Project: Morgan Hill Location: B-4 Sample Number: Bulk Sample      Depth: 0.5 - 3.0 Date: 9/9/2004	Tested by: Checked by: Remarks:
R-VALUE TEST REPORT <b>THE TWINING LABORATORIES, INC.</b>	Figure No. _____

# R-VALUE TEST REPORT



**Resistance R-Value and Expansion Pressure - Cal Test 301**

No.	Compact. Pressure psi	Density pcf	Moist. %	Expansion Pressure psi	Horizontal Press. psi @ 160 psi	Sample Height in.	Exud. Pressure psi	R Value	R Valu Cor
1	120	127.2	7.8	0.00	110	2.51	338	19.3	19.
2	60	125.9	8.2	0.00	130	2.51	198	9.6	9.6
3	300	129.0	7.4	0.00	102	2.46	513	26.7	26.

Test Results	Material Description
<p>R-value at 300 psi exudation pressure = 16.9</p>	
<p>Project No.: A07261.03                      Project: Morgan Hill                      Location: B-7                      Sample Number: Bulk Sample      Depth: 0.5 - 2.0                      Date: 9/8/2004</p>	<p>Tested by:                      Checked by:                      Remarks:</p>
<p>R-VALUE TEST REPORT</p> <p><b>THE TWINING LABORATORIES, INC.</b></p>	

Figure No. \_\_\_\_\_



2527 Fresno Street  
Fresno, CA 93721  
(559) 268-7021 Phone  
(559) 268-0740 Fax

September 14, 2004

Work Order #: 4107008

Harry Wise  
Twining Geotechnical Department  
2527 Fresno Street  
Fresno, CA 93721

RE: Browman Morgan Hill

Enclosed are the analytical results for samples received by our laboratory on 09/07/04. For your reference, these analyses have been assigned laboratory work order number 4107008.

All analysis have been performed according to our laboratory's quality assurance program. All results are intended to be considered in their entirety, The Twining Laboratories, Inc. (TL) is not responsible for use of less than complete reports. Results apply only to samples analyzed.

If you have any questions, please feel free to contact us at the number listed above.

Sincerely,

The Twining Laboratories, Inc.



Ronald J. Boquist

Director of Analytical Chemistry



2527 Fresno Street  
Fresno, CA 93721  
(559) 268-7021 Phone  
(559) 268-0740 Fax

Twining Geotechnical Department  
2527 Fresno Street  
Fresno CA, 93721

Project: Browman Morgan Hill  
Project Number: A07261.03  
Project Manager: Harry Wise

Reported:  
09/14/04

### ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
B-12	4I07008-01	Soil	09/02/04 00:00	09/07/04 12:03
B-2 (1.5-3)	4I07008-02	Soil	09/02/04 00:00	09/07/04 12:03

The Twining Laboratories Inc.

Ronald J. Boquist, Director of Analytical Chemistry  
Joseph A. Ureno, Quality Assurance Manager

*The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.*

Twining Geotechnical Department  
2527 Fresno Street  
Fresno CA, 93721

Project: Browman Morgan Hill  
Project Number: A07261.03  
Project Manager: Harry Wise

Reported:  
09/14/04

**B-12**  
4I07008-01 (Soil)

Analyte	Result	Reporting Limit	Units	Batch	Prepared	Analyzed	Method
<b>Inorganics</b>							
Chloride	8.0	6.0	mg/kg	T4I0809	09/08/04	09/08/04	ASTM D-4327-84
Chloride	0.00080	0.00060	% by Weight	[CALC]	09/08/04	09/08/04	ASTM D4327-84
Sulfate as SO4	0.00068	0.00060	% by Weight	[CALC]	09/08/04	09/08/04	ASTM D4327-84
pH	5.8		pH Units	T4I0809	09/08/04	09/08/04	ATSM D4972-89 Mod
Resistivity	16000		ohms/cm	T4I0809	09/08/04	09/08/04	ASTM D1125-82
Sulfate as SO4	6.8	6.0	mg/kg	T4I0809	09/08/04	09/08/04	ASTM D4327-84

The Twining Laboratories Inc.

Ronald J. Boquist, Director of Analytical Chemistry  
Joseph A. Ureno, Quality Assurance Manager

*The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.*

Twining Geotechnical Department  
2527 Fresno Street  
Fresno CA, 93721

Project: Browman Morgan Hill  
Project Number: A07261.03  
Project Manager: Harry Wise

Reported:  
09/14/04

**B-2 (1.5-3)**  
4I07008-02 (Soil)

Analyte	Result	Reporting Limit	Units	Batch	Prepared	Analyzed	Method
<b>Inorganics</b>							
Chloride	7.7	6.0	mg/kg	T4I0809	09/08/04	09/08/04	ASTM D-4327-84
Chloride	0.00077	0.00060	% by Weight	[CALC]	09/08/04	09/08/04	ASTM D4327-84
Sulfate as SO <sub>4</sub>	0.0024	0.00060	% by Weight	[CALC]	09/08/04	09/08/04	ASTM D4327-84
pH	6.2		pH Units	T4I0809	09/08/04	09/08/04	ATSM D4972-89 Mod
Resistivity	16000		ohms/cm	T4I0809	09/08/04	09/08/04	ASTM D1125-82
Sulfate as SO <sub>4</sub>	24	6.0	mg/kg	T4I0809	09/08/04	09/08/04	ASTM D4327-84

**Notes and Definitions**

ND Analyte NOT DETECTED at or above the reporting limit  
NR Not Reported  
RPD Relative Percent Difference

*Quality Control Data Available Upon Request*

The Twining Laboratories Inc.

Ronald J. Boquist, Director of Analytical Chemistry  
Joseph A. Ureno, Quality Assurance Manager

*The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.*